

Final Report
QAQC Project No. 8CA96051

1.0 Executive Summary

Things that worked very well included use of field sheets; both transect forms and data item sheets, data base for entry, String boxes worked very well for distance and for finding the location of previous transect placement. We found that field efficiency went up when we separated and did the less complicated (or less interpretive) tasks alone. A very vital step proved to be the communication with the owner/manager relative to permission and access constraints.

Things that could have worked better included length of time between R/C's work and receipt of field maps, mapping accuracy in the field, flagging leading to reproducibility. The training process will need to be examined to see where it can be improved. Possibly 90% of consistency of observation and interpretation will be traced back to the combination of the training and experience of the individual prior to QAQC activities and the training he/she gets to prepare them for the work. We found that the seasonal period during which we conducted our observations impacted our observations. This is tied into the aspect of the time delay between the prime contractors work and our getting into the field.

Specific field observations and their subsequent recording on the data and transect sheets went very well. Often Michael and I separated on the less complicated tasks, such as the landings, watercourse crossings and skid trails, and even though apart our observations seemed very consistent. When we did the roads and WLPZ's together there was often very little question as to the entry(ies) to be placed on the transect sheets in order to describe our observations. More widely divergent results were noted in the definition of what actually constitutes a "problem point" and the entries on the Implementation work sheets.

Vast majority of the time was spent in travel to and from field sites. With practice and juxtaposition of THP's two could be completed, in the field, in one day.

Ability to navigate in the field using basic maps is the essential qualification to gaining efficiency. Observations would be best done by individuals with forestry engineering background. Relative to the implementation sheets thorough knowledge of the rules and direct experience with their application in the field is essential. Other qualifications, such as a soils or restoration specialist are not as essential. Knowing the operational forestry environment and the interactions with the physical environment are essential.

2.0 The QAQC Process

2.1 The Training Process

The training process relied heavily, perhaps too much so, on our training and experience coming into the project. The eight hours in the field with Peter Caferrata and John Munn prepared us to adequately fill out the data sheets and transect forms but less so the subsequent Implementation forms. One aspect we found to pose the greatest problem not covered in the training was where we had situations of a combination of a multiple of contributing features. This will be covered in greater detail in the field process section. Another aspect not really handled in the training process was the consideration process leading to the completion of the Implementation forms. Both these decision pathways became more subjective as they relied more on our individual training and experience rather than some specific training examples.

2.2 The Pre-Field Process

Our pre-field process included the thorough examination of the THP's, route planning, visit scheduling and owner/manager communication. The first three were straightforward and required a maximum of three hours per THP. We were provided with the complete THP file and found that really only the THP and associated addendums were needed. We didn't have any use for the completion and tracking forms also provided. Truly critical was the process of contacting the owner/manager. Our intent was to reconfirm permission to access the lands, determine the best local routing to the site and identify any access constraints. I sent an initial letter on my office letterhead and followed it up with a phone call. The large industrial entities were completely cooperative, in some instances making someone available to take us directly to the site. The non-industrial owners were a little less responsive, perhaps thinking we would be inspecting again for violations. When talking with them I often had to reiterate the goal of the monitoring program and explain what we would be doing on their lands. With just this little bit of explanation they all cooperated and were helpful.

2.3 The Field Process

2.3.1 Time Expenditures

The time spent, on the average, completing each of the field activity segments was as follows. Shown is the running time and the man hours required.

<u>Activity</u>	<u>Running Time</u>	<u>Man-Hours</u>
Pre-field	3-4	3-4
Travel to/from site	6-10	12-20
On-site examinations	4-6	8-12

The prefield activities included the above mentioned THP reading, route and schedule planning and owner/manager communication. The travel was "door-to-door" and was, as a block, the most significant expenditure of time. Because of the spread out nature of the sites and the availability of roads in the north-west part of the state highway times were very high. Once off the highway it took us on the average two to three hours to find the site and return to highway. The on-site examinations included the completion of the site observations and filling out of the transect and implementation forms. Breakdowns of the running field and data entry times; by whole THP and within THP individual tasks, is presented in Addendum I.

2.3.2 THP Location

With just a couple of exceptions location of the THP site and necessary appurtenant roads proved to be no problem. The maps provided with the THP's were sufficient. However, problems were encountered in a couple of instances where there was a lack of a map at a medium scale. The small scale maps provided were really too small, not showing enough detail to identify appurtenant roads and the subsequent large scale maps were too restricted in their coverage to provide the link. In one instance, THP 2-93-81/SHA, we had to search out one of the owners, at a cost of about four hours, who gave us a detailed verbal description how to get to the property.

2.3.3 Site/Transect Location

This aspect is the most important factor that will impact the repeatability of the transects and there proved to be some problems. We found that flagging was, in general, inadequate to consistently permit relocation of start and end points of the transects and site features. The best situation occurred with watercourse crossings and the worst with WLPZ's. Rankings would be:

Worst	WLPZ's
	Skid trails
	Landings
	Roads
Best	Watercourse crossings

A principal factor was the time which had passed between when the prime contractors finished and we were provided the maps enabling us to complete our process and get into the field. During this passage of time both the flagging and string lines indicating the path chosen can be removed or destroyed, by either man or beast. We had several instances where landings had no flagging and we had to depend on map locations. We often had to rely on the presence of string, either the transect line itself or the tie-off points, to determine the presence and location of the transect-based samples.

A second problem, relative to site/transect location, was the that the map used to provide the locations was often of insufficient scale to show the details with no confusion. For example, often the WLPZ's were marked with blue highlighter, which showed the general location really well but didn't provide really specific site location. We often could not tell which side of the watercourse was sample and expended time trying to determine this.

We could not determine whether flagging consistency was a problem from what we encountered in the field. We did locate start point flagging much more consistently than end point flagging. We could not tell if end point flagging was not done or it was just destroyed or removed more consistently.

When found the flagging annotation was good. We had one case of confusing annotation, THP 1-93-362/TRI, where we could not figure out the sequence of multiple transect segments and start points.

We had one case of mapping inconsistency. For THP 1-94-496 we found a watercourse crossing which was mapped but not flagged (which we did because of previously encountered lack of flagging) and, then subsequently, a more logical watercourse which was flagged and not mapped.

2.3.4 Site/Transect Observation and Recording

We found the data recording sheets to be comprehensive, and when used in conjunction with the accompanying data category sheets capable of accurately recording the physical conditions encountered. We did encounter some instances where the written definition of a feature didn't accurately reflect true field conditions, for example through fills. We observed that with the smaller partial and full bench logging roads through fills were very hard to observe and record. In instances where we encountered culverted crossings we observed that often the fill at the upper end started within inches of the culvert and had, as such, no dimension to enter on the sheet. Some type of frequency of occurrence analysis will probably show which features figured heavily in the observed data set and those which did not. It will then be a question of whether the feature was definable within the

process offered by the data recording sheets or whether it really wasn't there to observe.

Where the basic recording sheets were fairly straight forward and well impacted by the albeit brief, but adequate, training the process of interpretation and filling out the Implementation forms was more a product of our individual training and direct experience. Probably essential to this process was what constituted a "problem point". Often time we had the observation of a physical structure indicating a problem but ancillary observations and/or previous experience indicated otherwise. A good example was the newly constructed Road 1 on THP 1-94-496/DEL. We observed a large number of gullies on the fill slope resulting from breaches in the outside berm and the erodibility of the material (meta-seds, and soft sed). To Michael these were all problem points and of a Class 4 in seriousness. I, however, did not see them as such due to the presence of a downslope berm created by the excavator which was receiving and trapping all the deposition from the gullies. Within the present structure of the QAQC approach we could not, in our opinions, adequately handle this particular situation. This proved to be the case in several other instances where we encountered multiple features resulting in a condition, or underlying systemic problem conditions.

Lastly, we often encountered conditions which we felt were different, because of the passage of time, than possibly what Roger's crew observed. We were able to do our work in the late fall and we knew that some of the features that were available to the earlier crew was masked by the impacts of rainfall and, at times, heavy litter accumulation from deciduation. We again questioned whether, in these cases, we were really sampling the same population.

2.4 The Data Entry Process

The data entry process went smoothly and, once experience was gained with the program, fairly quickly. Again in Addendum I are presented the data relative to the amount of time necessary to enter the information per individual task and for each THP. Portions of the data entry program proved to be a little cumbersome. For example there needs to be some flexibility in adding or deleting line records so that out of sequence observations can be included without re-entering large quantities of data. I also had two occurrences of entire blocks of data (one with 8 records and a second with 9 records) being shifted into a different order. I also encountered minor problems of navigation between portions of the program. It just needs a little gorilla debugging.

3.0 Summary and Recommendations

3.1 Standardized Approach

With the number of instances where the outcome depended heavily on individual training and experience it would seem to point to the need for a more comprehensive and documented description of the process. Repeatability is shattered by the influence of diverse background training and experience and any document which can minimize this influence will further the process.

Central to this documentation would be an indepth review of the training procedure and development of more comprehensive training documents. Most helpful would be either diagramatic or photographic examples of the conditions to be recognized in the field and then some discussions on resulting problems which occur in forestry situations. Also valuable would be some discussion of mitigations normally implemented to counteract impacts resulting from observed problems.

We do recommend that at least one, and better two or three, THP's be revisited with the sole intent of process feedback. We will now have some indication of data comparability but will really have no indication of the "WHY" it is either well or poorly correlated.

3.2 Field Procedures

Central to whatever problems we encountered were two elements: 1) the time delay between Roger and Cliff's work and ours, and 2) the problem of flagging. We recommend that future contracts be very specific in the amount of time that can pass between prime contract work and QAQC work. To be avoided at all costs is multi-season observations. Perhaps some system can be worked out where the QAQC contractor is aware of the THP's and site locations but the prime contractor still does his work "blind". This could be accomplished by CDF doing the transect and site selection and simply providing the prime contractor the selected sites. Then the QAQC effort would have prior knowledge of the specific sites and would then simply await notification that the sites were completed. This would eliminate the step of the prime contractor having to finish maps and getting them to the QAQC effort.

More effort has to be expended in documenting the sites and transects done during the prime contractor phase. Written descriptions must be produced and provided to the QAQC effort which reference the start and end points to some permanent and evident landmark. Flagging procedures have to be improved. Recommendations include using flagging unique to the effort, more durable flagging so it persists better, placement of flagging so it is observable from a distance and out of reach of beasts, and use of intermediate flagging, especially for WLPZ's and roads so that the repeat transect follows the same pathway.

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ADDENDUM I

Contents

Data entry record number

Time expenditures

THP 1-93-151

	Record	Transect	Field Time (min)	Data Entry Time (min)	Comments
Landings	1	1	20	12	
	2	2	11	11	
Roads	1	1	100	35	
	2	2	97	50	
WLPZ's	2	1	130	33	Position mismapped
WC Xings	1	2	30	20	
	2	1	20	17	
Skid Trails					
Total Time (min)			408	178	
Total Time (hr)			6.80	2.97	

THP 1-94-496

	Record	Transect	Field Time (min)	Data Entry Time (min)	Comments
Landings	3	1	10	11	
	4	2	10	10	
Roads	3	1	85	30	
	4	2	42	38	
WLPZ's	1	1	80	43	
WC Xings	3	1	25	16	
	4	2	20	18	
	5	3	32	18	
Skid Trails	1	1	50	13	
Total Time (min)			354	197	
Total Time (hr)			5.90	3.28	

THP 1-93-362

	Record	Transect	Field Time (min)	Data Entry Time (min)	Comments
Landings	5	1	15	7	
	6	2	15	8	
Roads	7	1	77	45	
	8	2	75	45	
WLPZ's	3	1	75	60	
	4	2	45	38	
WC Xings	8	1	30	20	
	9	2	25	20	
Skid Trails	6	1	45	15	
	7	2	45	16	
	Total Time (min)		447	274	
	Total Time (hr)		7.45	4.57	

THP 2-93-400

	Record	Transect	Field Time (min)	Data Entry Time (min)	Comments
Landings	7	1	15	5	
	8	2	10	5	
Roads	5	1	65	32	
	6	2	58	42	
WLPZ's	5	1	47	42	
	6	2	82	43	
WC Xings	10	1	25	15	
	11	2	25	15	
Skid Trails	8	1	30	12	
	9	2	25	13	
Total Time (min)			382	224	
Total Time (hr)			6.37	3.73	

THP 2-93-81

	Record	Transect	Field Time (min)	Data Entry Time (min)	Comments
Landings	9	1	13	5	
	10	2	12	5	
Roads	9	1	58	55	
	10	2	48	35	
WLPZ's	9	1	60	45	
	10	2	50	55	
WC Xings					
Skid Trails	2	1	30	25	
	3	2	27	33	
	Total Time (min)		298	258	
	Total Time (hr)		4.97	4.30	

THP 2-92-308

	Record	Transect	Field Time (min)	Data Entry Time (min)	Comments
Landings	11	1	15	7	
	12	2	20	7	
Roads	11	1	50	55	
	12	2	60	23	
WLPZ's	7	1	80	35	
	8	2	92	35	
WC Xings	6	1	18	20	
	7	2	27	20	
Skid Trails	4	1	25	18	
	5	2	25	23	
	Total Time (min)		412	243	
	Total Time (hr)		6.87	4.05	

THP 4-94-73

	Record	Transect	Field Time (min)	Data Entry Time (min)	Comments
Landings	13	1	14	8	
	14	2	5	9	
Roads	19	1	30	30	
	20	2	35	40	
WLPZ's	11	1	70	70	Transect B done in reverse order
	16	2	120	31	Transect B done in reverse order
WC Xings	17	1	25	11	
	18	2	25	6	
Skid Trails	10	2	20	34	
	11	1	27	34	
Total Time (min)			371	273	
Total Time (hr)			6.18	4.55	

THP 4-94-141

	Record	Transect	Field Time (min)	Data Entry Time (min)	Comments
Landings	15	1	10	8	
	16	2	13	9	
Roads	17	1	48	45	
	18	2	55	30	
WLPZ's	14	1	61	35	
	15	1	73	34	
WC Xings	15	1	20	11	
	16	2	25	8	
Skid Trails	12	1	30	13	
	13	2	32	11	
Total Time (min)			367	204	
Total Time (hr)			6.12	3.40	

THP 4-94-55

	Record	Transect	Field Time (min)	Data Entry Time (min)	Comments
Landings	19	1	11	3	
	20	2	10	3	
Roads	15	1	28	24	
	16	2	47	38	
WLPZ's	13	1	65		
WC Xings	12	1	15	11	
	13	2	16	8	
Skid Trails	14	1	24	32	
	15	2	43	24	
Total Time (min)			259	143	
Total Time (hr)			4.32	2.38	

THP 4-92-53

	Record	Transect	Field Time (min)	Data Entry Time (min)	Comments
Landings	17	1	7	5	
	18	2	26	6	
Roads	13	1	25		
	14	2	27		
WLPZ's	12	2	72	83	
WC Xings	14	1	18	11	
Skid Trails	16	1	5	28	
	17	2	5	7	
	Total Time (min)		185	140	
	Total Time (hr)		3.08	2.33	

QAQC Landings

Record	THP	Transect	Field Time (min)	Data Entry Time (min)	Comments
1	1-93-151	1	20	12	
2	1-93-151	2	11	11	
3	1-94-496	1	10	11	
4	1-94-496	2	10	10	
5	1-93-362	1	15	7	
6	1-93-362	2	15	8	
7	2-93-400	1	15	5	
8	2-93-400	2	10	5	
9	2-93-81	1	13	5	
10	2-93-81	2	12	5	
11	2-92-308	1	15	7	
12	2-92-308	2	20	7	
13	4-94-73	1	14	8	
14	4-94-73	2	5	9	
15	4-94-141	1	10	8	
16	4-94-141	2	13	9	
17	4-9253	1	7	5	
18	4-92-53	2	26	6	
19	4-94-55	1	11	3	
20	4-94-55	2	10	3	

QAQC Roads

Record	THP	Transect	Field Time (min)	Data Entry Time (min)	Comments
1	1-93-151	1	100	35	
2	1-93-151	2	97	50	
3	1-94-496	1	85	30	
4	1-94-496	2	42	38	
5	2-93-400	1	65	32	
6	2-93-400	2	58	42	
7	1-93-362	1	77	45	
8	1-93-362	2	75	45	
9	2-93-81	1	58	55	
10	2-93-81	2	48	35	
11	2-92-308	1	50	55	
12	2-92-308	2	60	23	
13	4-92-53	1	25		
14	4-92-53	2	27		
15	4-94-55	1	28	24	
16	4-94-55	2	47	38	
17	4-94-141	1	48	45	
18	4-94-141	2	55	30	
19	4-94-73	1	30	30	
20	4-94-73	2	35	40	

QAQC Skids

Record	THP	Transect	Field Time (min)	Data Entry Time (min)	Comments
1	1-94-496	1	50	13	
2	2-93-81	1	30	25	
3	2-93-81	2	27	33	
4	2-92-308	1	25	18	
5	2-92-308	2	25	23	
6	1-93-362	1	45	15	
7	1-93-362	2	45	16	
8	1-93-400	1	30	12	
9	1-93-400	2	25	13	
10	4-94-73	2	20	34	
11	4-94-73	1	27	34	
12	4-94-141	1	30	13	
13	4-94-141	2	32	11	
14	4-94-55	1	24	32	
15	4-94-55	2	43	24	
16	4-92-53	1	5	28	
17	4-92-53	2	5	7	

QAQC WLPZ's

Record	THP	Transect	Field Time (min)	Data Entry Time (min)	Comments
1	1-94-496	1	80	43	
2	1-93-151	1	130	33	
3	1-93-362	1	75	60	Position mismatched
4	1-93-362	2	45	38	
5	2-93-400	1	47	42	
6	2-93-400	2	82	43	
7	2-92-308	1	80	35	
8	2-92-308	2	92	35	
9	2-93-81	1	60	45	
10	2-93-81	2	50	55	
11	4-94-73	1	70	70	Transect B done in reverse order
12	4-92-53	2	72	83	
13	4-94-55	1	65		
14	4-94-141	1	61	35	
15	4-94-141	1	73	34	
16	4-94-73	2	120	31	Transect B done in reverse order

QAQC WC Xing's

Record	THP	Transect	Field Time (min)	Data Entry Time (min)	Comments
1	1-93-151	2	30	20	
2	1-93-151	1	20	17	
3	1-94-496	1	25	16	
4	1-94-496	2	20	18	
5	1-94-496	3	32	18	
6	1-92-308	1	18	20	
7	1-92-308	2	27	20	
8	1-93-362	1	30	20	
9	1-93-362	2	25	20	
10	2-93-400	1	25	15	
11	2-93-400	2	25	15	
12	4-94-55	1	15	11	
13	4-94-55	2	16	8	
14	4-92-53	1	18	11	
15	4-94-141	1	20	11	
16	4-94-141	2	25	8	
17	4-94-73	1	25	11	
18	4-94-73	2	25	6	